of ozone. Further, gaseous ions exhibit no power to constitute condensation nuclei, so that ionization of the air by either radioactive substances or Röntgen rays has not been shown to be a necessary or sufficient cause for the condensation of supersaturated aqueous vapor.

Trees, especially tall ones and those rich in resins, give rise to ozone, and should therefore favor production of rain. Opinions on the actual influence exerted by trees are, however, very variable.—*T. H. P[ope].*

EVAPORATION OF MERCURY DROPLETS SUSPENDED IN A GAS.[1]

By A. SCHIDLOF & A. KARPOWICZ.

[*Reprinted from* Science Abstracts, Sect. A, Sept. 28, 1914, § 1569.]

The authors have previously experienced difficulty with experiements as to the value of the electron charge from the motion of mercury droplets between the plates of a condenser, in that the speeds of these drops become less with increase of time under given fields. They have now tried nitrogen as well as air between the condenser plates and extended the time to over an hour. The speed-time graphs slope down in the same way for each gas, the speeds becoming less and less as time goes on. The reductions in an hour's time are to about $\frac{1}{2}$ in the case of air and to about $\frac{1}{4}$ for nitrogen. It is also noticed that the droplets become more difficult to see as the experiments proceed. The conclusion adopted is that the droplets of mercury suffer evaporation under the action of the light.—*E. H. B[arton].*

EVAPORATION AND ADSORPTION.[2]

By A. SCHIDLOF.

[*Reprinted from* Science Abstracts, Sect. A, July 30, 1917, §578.]

Gives a theory of the phenomena of continuous variation of the mass and of the density of drops of mercury maintained in suspension in a gas.

The hypothesis of molecular bombardment leads to the supposition of a film or layer of adsorption covering the surface of a liquid which is in the presence of a gas. The supposition of this layer of adsorption, combined with that of the molecular bombardment, suffices to explain the whole of the facts observed by A. Targonski.—*E. H. B[arton].*

DYNAMICS OF REVOLVING FLUIDS.[3]

551.511 By LORD RAYLEIGH.

[*Reprinted from* Science Abstracts, Sect. A, Apr. 30, 1917, § 287.]

Meteorology depends ultimately so greatly on the mechanics of revolving fluids that the clear formulation of such simple conclusions as are within reach may be expected to guide the judgment when exact analysis seems impracticable. Aitken's recent paper on "The dynamics of cyclones and anticyclones" is taken as the starting point of the present inquiry, although the present author dissents in some respects from Aitken's views. The condition of symmetry round an axis is here imposed throughout, so that the fundamental equations are most appropriately expressed in terms of cylindrical coordinates, r,θ,z, the velocities u,v,w, being measured in the directions in which these increase. It is then shown that rv may be considered to move with the liquid, in accordance with Kelvin's general theorem respecting "circulation," provided that where V is the potential of extraneous forces, $P \equiv \int dp/\rho - V$, be independent of θ, which will be the case if ρ be constant or a known function of p, and P be single valued. The motion u,w, will then be the same as for $v=0$, provided we introduce a force v^2/r along r.

Case $u=w=0$.—Let gravity act parallel to z (measured downward) on a gas following Boyle's law. Then at a constant level p diminishes inward. But the resulting rarefaction will not cause ascent, inflow of the heavier part outside being prevented by the centrifugal force. The equilibrium of fluid revolving one way round in cylindrical layers between coaxial cylindrical walls will be stable only if the circulation increases with r, and neutral for the circulation constant. With a viscous fluid the stability will be unimpaired by rotation of the outer cylinder, but destroyed by rotation of the inner one. This does not conflict with Kelvin's condition of minimum energy that vorticity must increase outward ("Collected Papers," v. 4, p. 175), for he supposed operations on the boundary changing the moment of momentum, which is here constant. On the other hand, he maintains the strictly two-dimensional character of the admissible variations. But the passage from one two-dimensional state to another may be effected by variations which are not two-dimensional. Of course transition from unstable to permanent stable equilibrium is impossible without dissipative forces, as in the case of a heterogeneous liquid under gravity. But ordinary viscosity does not meet the requirements here considered, as it would interfere with the constancy of circulation. For purely theoretical purposes, however, there is no inconsistency in supposing the u,w, motion resisted while the v motion is unresisted.

Case $u=f(r, t)$, $w=0$ or finite constant.—Then P is independent of z, and the pressure is determined by the equation,

$$du/dt + udu/dr = -v^2/r - \mathrm{P}d\mathrm{P}/dr.$$

For an incompressible liquid r is determined by the equation of continuity $ur = \phi(t)$, and when u and the initial conditions are known, v follows. The motion, now two-dimensional, is conveniently expressed in terms of the vorticity, which moves with the fluid, and the stream function. For the former initially, and therefore permanently, constant throughout the fluid, the appropriate solution shows that if centrally the motion be one of pure rotation, as of a solid, the outer wall will close in, and, in addition to the pure rotation, the fluid will acquire the motion of a simple vortex of intensity, increasing as the radius of the outer wall diminishes. If the fluid be contained between two coaxial cylinders, both walls must move inward together, and the process will end when the inner wall reaches the axis; but the inner wall, or both, may be dispensed with, and the inflow at $r=r_1$ be supposed removed. It will then remain true that, if it thus pass at a constant pressure, the pressure at $r=r_2$ must continually increase. If a limiting pressure be reached, the inward flow must cease. Calculation of any more general case does not seem practicable, but it can be seen that when the u,w motion is slow relatively to the v motion a kind of equilibrium theory is approximately applicable, much as when the slow motion under gravity of a

[1] Comptes Rendus, Paris, June 29, 1914, 158: 1992-1994.
[2] Archives des Sciences, ———, Mar., 1917, 43:217-244.
[3] Proceedings, Roy. Soc., London, Mar. 1, 1917, 93:148-154.